

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-40

Name: Clear Lake

County: Minnehaha

Legal Description: T103-R51-Sec. 6; T103-R52-Sec. 1; T104-R51-Sec. 31; T104-R52-Sec. 36

Location from nearest town: 3 mi. west, 2 mi. south, and $\frac{3}{4}$ mi. west of Colton, SD

Dates of present survey: June 27-28, 2007

Dates of the last survey: June 28-29, 2005

Management classification: Warmwater Marginal

Primary Game Species	Other Species
Yellow Perch	Black Bullhead
Northern Pike	Common Carp
Walleye	White Sucker
	Green Sunfish
	Orange-spotted Sunfish

PHYSICAL DATA

Surface Area: 472 acres

Maximum depth: 11 feet

Volume: No data

Contour map available: No

OHWM elevation: None set

Outlet elevation: None set

Lake elevation observed during the survey: Full

Watershed: No data

Mean depth: 4 feet

Shoreline length: No data

Date mapped: NA

Date set: NA

Date set: NA

Beneficial use classifications: (6) warmwater marginal fish propagation, (7) immersion recreation, (8) limited-contact recreation and (9) wildlife propagation and stock watering.

Introduction

Clear Lake, a shallow, natural lake located in northwestern Minnehaha County, was named for the clear water it contained decades ago. The lake is now heavily degraded and suffers numerous algae blooms and fish kills. It receives its water from a relatively small local watershed and ground water. Outflows exit down a small, unnamed creek to Skunk Creek and then the Big Sioux River.

Describe Ownership of Lake and Adjacent Lakeshore Properties

Clear Lake is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes. The South Dakota Department of Game, Fish, and Parks (GFP) owns and manages Game Production Areas (GPAs) on the east and south shores of the lake. The United States Fish and Wildlife Service (USFWS) owns and manages a Waterfowl Production Area (WPA) on the north shore. The remainder of the shoreline is privately owned.

Fishing Access

Clear Lake has a boat ramp on the east side that needs to be replaced and is only usable by small boats. Shore fishing is difficult due to lack of access. Ice fishing is the most popular activity on the lake.

Field Observations of Water Quality and Aquatic Vegetation

During the survey, the water clarity was poor with a Secchi depth measurement of only 0.2-m (8.0 inches) due to excessive algae. No aquatic vegetation was observed.

BIOLOGICAL DATA

Methods:

Clear Lake was sampled on June 27-28, 2007 with three overnight gill-net sets and five overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh (3/4 in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Gill-net and trap-net sites are displayed in Figure 2.

Results and Discussion:

Gill Net Catch

Black bullhead (74.1%) and common carp (11.9%) were the most abundant species sampled in the gill nets (Table 1). Yellow perch, orange-spotted sunfish, northern pike, and walleye were also sampled.

Table 1. Total catch from three overnight gill net sets at Clear Lake, Minnehaha County, June 27-28, 2007.

Species	Number	Percent	CPUE ¹	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	143	74.1	47.7	+8.1	18.7	28	0	96
Common Carp	23	11.9	7.7	+1.9	12.7	58	11	91
Yellow Perch	13	6.7	4.3	+0.9	14.0	69	8	100
O. S. Sunfish	12	6.2	4.0	+2.0	1.0	--	--	--
Northern Pike	1	0.5	0.3	+0.4	1.0	--	--	--
Walleye	1	0.5	0.3	+0.4	0.1	--	--	--

* 4 years (1999, 2001, 2003, 2005)

Trap Net Catch

Black bullheads comprised 81.7% of the trap net catch this year (Table 2). Other species sampled included orange spotted sunfish, common carp, green sunfish and white sucker.

¹ See Appendix A for definitions of CPUE, PSD, and mean Wr.

Table 2. Total catch from five overnight trap net sets at Clear Lake, Minnehaha County, June 27-28, 2007.

Species	Number	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	1,059	81.7	211.8	± 66.4	920.0	26	0	91
O. S. Sunfish	190	14.7	38.0	± 28.3	0.1	--	--	--
Common Carp	32	2.5	6.4	± 1.8	5.9	38	29	92
Green Sunfish	12	0.9	2.4	± 1.5	2.1	8	0	130
White Sucker	3	0.2	0.6	± 0.8	0.1	--	--	--

* 4 years (1999, 2001, 2003, 2005)

Yellow Perch

Management objective: Maintain a yellow perch population with a gill-net CPUE of at least 50 and a PSD range of 30-60.

Yellow perch numbers remain low (Table 3) despite stockings of fingerling, juvenile and adult perch since the 2001 winterkill (Table 6). Very few perch were seen during bullhead removal efforts in 2003, 2004, 2005, and 2006, confirming our findings during the lake surveys. Nine of the 13 yellow perch sampled had oxytetracycline (OTC) marks identifying them as stocked fish. Applying the Clear Lake marking percentage to the 2007 summer gill net catch, the stocking of 5,670 juvenile yellow perch (12/acre) into Clear Lake produced a gill-net catch of 3.2 (178-262 mm) fish/net set.

Table 3. Yellow perch gill-net CPUE, PSD, and mean Wr for Clear Lake, Minnehaha County, 1998-2007.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CPUE	44.3			0.3		1.0		10.3		4.3
PSD	50			--		--		84		69
RSD-P	33			--		--		29		8
Mean Wr	103			--		--		105		100

Black Bullhead

Management objective: Maintain a black bullhead population with a trap-net net CPUE of less than 100.

Clear Lake has a history of overabundant black bullhead populations. Even though a large portion of the population was killed during the 2001 winterkill, there were enough survivors to repopulate the lake. Bullhead removal projects were conducted in 2003, 2004, 2005 and 2006 (Table 4), but trap-net CPUE still exceeds our management objective. The bullheads sampled in this year's survey ranged in length from 108-259 mm. (4.3-10.2 in) (Figure 1).

Table 4. Number and weight of bullheads captured during removal projects in Clear Lake, Minnehaha County, 2003-2006.

Year	Number	Pounds	Pounds/Acre
2003	*		
2004	5,898	14,155	12.5
2005	3,200	21,080	6.8
2006	*		

*unavailable

All Species

Non-game species have increased in abundance in Clear Lake (Table 5). Recent walleye and yellow perch stocking efforts were apparently unsuccessful.

Table 5. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Clear Lake, Minnehaha County, 1998-2007.

Species	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
COC (GN)		40.3		0.3		9.0		1.3		7.7
COC (TN)		0.7		2.1		3.8		4.0		6.4
WHS (GN)		--		--		--		--		--
WHS (TN)		0.03		0.4		--		--		0.6
BLB (GN)		14.0		--		62.5		44.3		47.7
BLB (TN)		98.6		15.7		1499.4		200.4		211.8
NOP (GN)		1.0		--		--		3.0		0.3
NOP (TN)		--		0.1		--		11.8		--
GSF (GN)		0.7		--		--		--		--
GSF (TN)		0.2		2.9		0.4		0.2		2.4
OSF (GN)		3.0		--		--		1.0		--
OSF (TN)		--		0.3		--		--		38.0
HYB (GN)		--		--		--		--		--
HYB (TN)		0.2		--		--		--		--
YEP (GN)		44.3		0.3		1.0		10.3		4.3
YEP (TN)		0.2		15.1		0.8		0.6		--
WAE (GN)		--		--		--		0.3		0.3
WAE (TN)		--		--		--		--		--

COC (Common Carp), WHS (White Sucker), BLB (Black Bullhead), NOP (Northern Pike), GSF (Green Sunfish), OSF (Orange-spotted Sunfish), HYB (Hybrid Sunfish), YEP (Yellow Perch), WAE (Walleye)

RECOMMENDATIONS

1. Continue to manage Clear Lake as a marginal perch/bullhead fishery. Stock yellow perch adults following winterkills and manage the bullhead population with commercial fishing or Department removals as needed.
2. Conduct research to identify potential causes for our inability to create a viable fishery in Clear Lake.

Table 6. Stocking record for Clear Lake, Minnehaha County, 1991-2007.

Year	Number	Species	Size
1997	4,722	Yellow Perch	Adult
1998	4,680	Yellow Perch	Adult
2000	28,152	Yellow Perch	Juvenile
2001	5,040	Yellow Perch	Juvenile
2002	23,570	Yellow Perch	Juvenile
2003	154	Yellow Perch	Juvenile
2004	4,229	Yellow Perch	Fingerling
	1,144	Northern Pike	Adult
	7,963	Yellow Perch	Fingerling
	100	Yellow Perch	Adult
2005	472	Northern Pike	Adult
	94,300	Walleye	Fingerling
2006	5,670	Yellow Perch	Juvenile
2007	765	Yellow Perch	Juvenile

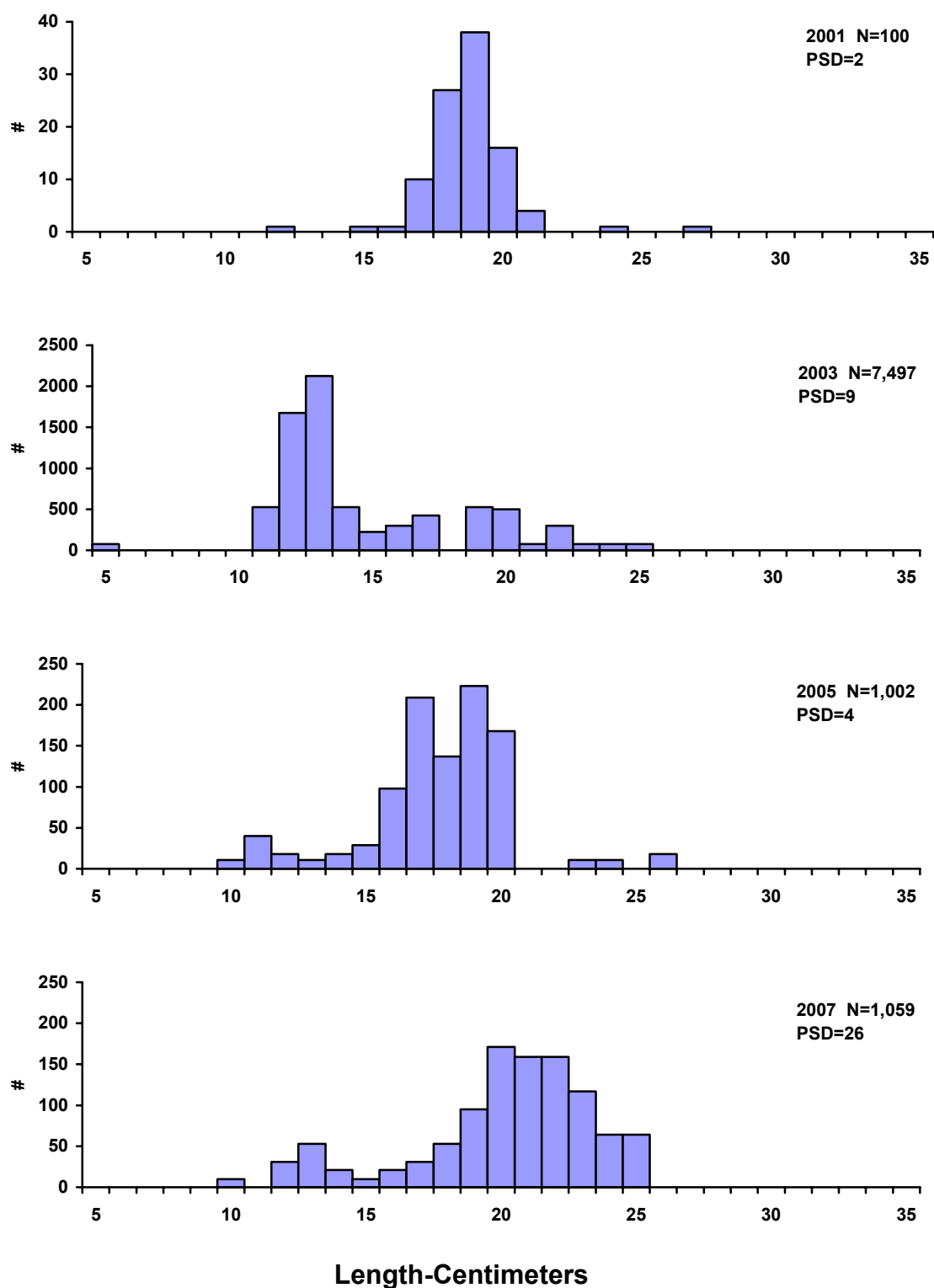


Figure 1. Length frequency histogram for black bullheads sampled in trap nets from Clear Lake, Minnehaha County, 2001, 2003, 2005, and 2007.

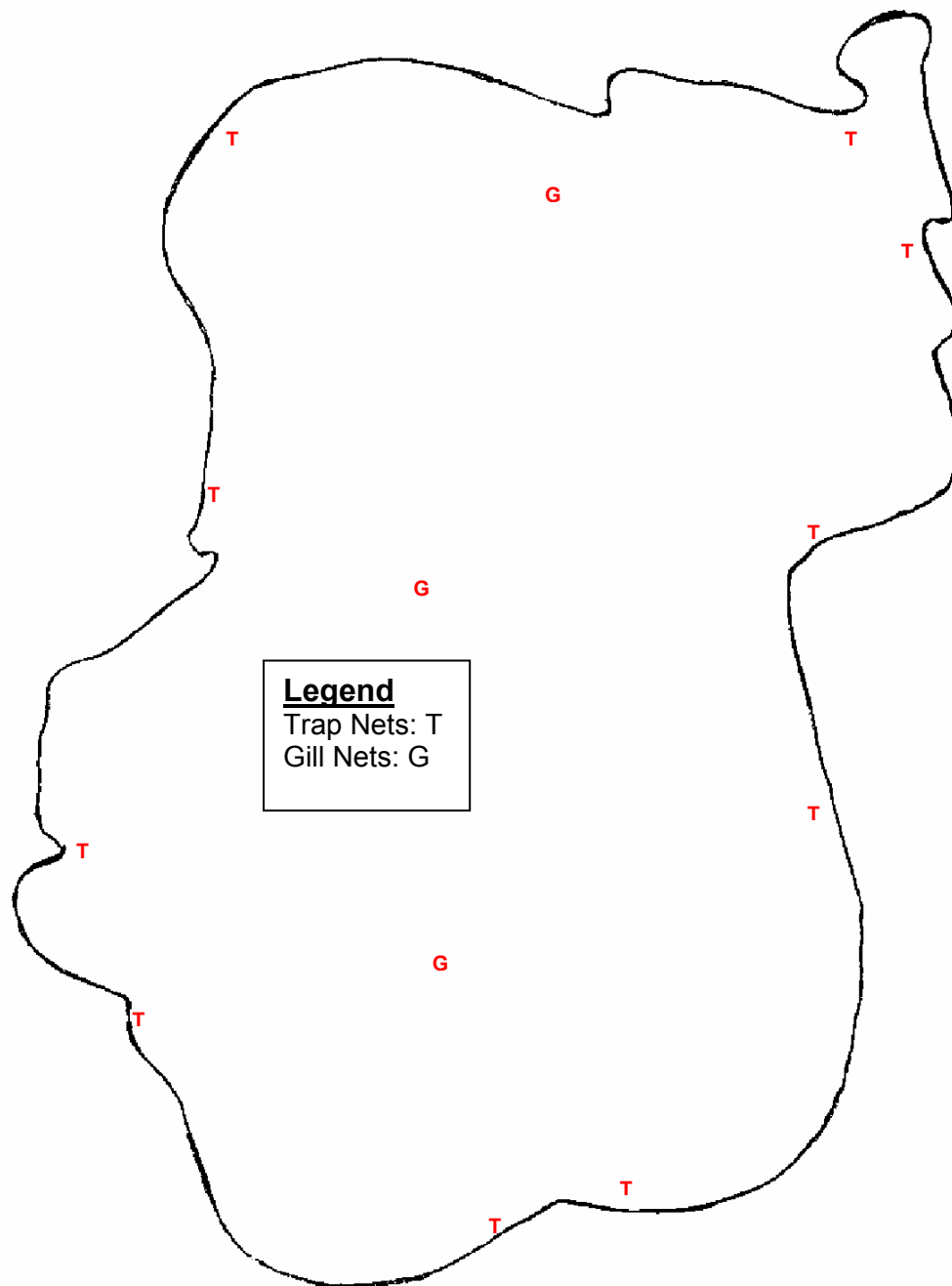


Figure 2. Sampling locations on Clear Lake, Minnehaha County, 2007.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.